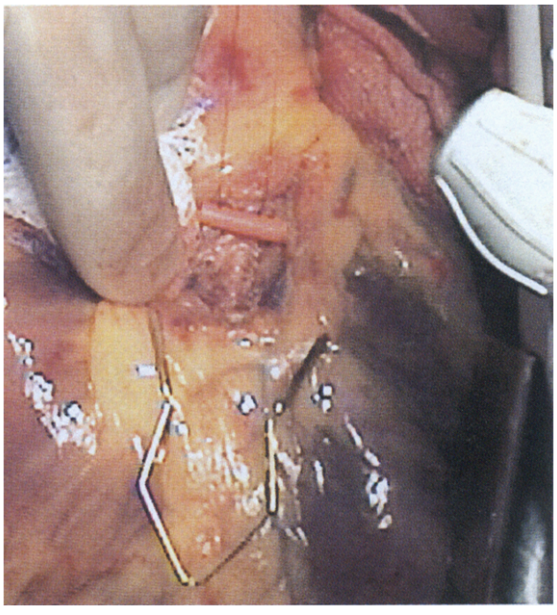

Fig 2. Ridges of myocardial tissue on either side of the left anterior descending coronary artery after division by the harmonic scalpel. Note the bloodless field and the depth of the left anterior descending artery in the myocardium.

the use of electrocautery. Poor control of damaging electrical energy dissipation and the possibility of induced ventricular fibrillation make the use of such an instrument dangerously cumbersome. The use of multiple fine sutures is time consuming because they tear through the fragile epicardial tissues and fat. In these circumstances, the use of the harmonic scalpel is safe and superior to other conventional methods.

The Ultracision harmonic scalpel (Ethicon Endo-Surgery, Inc, Cincinnati, Ohio) consists of a pulse generator from piezoelectric crystals that cause mechanical vibrations of an attached blade at 55,000 cycles/s. Ultrasonic coagulation is caused by denaturation of protein from transfer of mechanical energy to the surrounding tissue.

There is very little transfer of thermal energy and no transfer of electrical energy at all to the tissues. In fact, temperature measurements 0.5 cm away from the point of contact have demonstrated less than a 1°C rise,[1] macroscopic lateral tissue damage extended to only 1 mm, and microscopic tissue damage extended to only 3 mm.[2] Bipolar electrocautery produced 10 times more tissue damage in addition to transferring electrical energy to the tissues.

The requirements of a bloodless field, minimal surrounding tissue damage, and no transfer of electrical energy to the tissues, which are all essential to the beating-heart operations, are fully realized in the Ultracision harmonic scalpel.

We used this technique in 4 patients. In 3 an intramyocardial left anterior descending artery and in the fourth a right coronary artery embedded in the atrioventricular fat were isolated with the scalpel power level set at 3. No epicardial sutures or clips were used. During these isolations no atrial or ventricular arrhythmias were noted. Optimal visualization was achieved in all cases by easy, bloodless melting of fat and accurate division of myocardial fibers (Figs 1 and 2). Postoperative cardiac catheterizations revealed excellent anastomoses. Additional advantages include compatibility with pacemakers and the lack of need for grounding pads.

On the basis of our experience, we recommend the use of the harmonic scalpel for isolation of intramyocardial arteries in operations on the beating heart, because it produces a bloodless field with minimal tissue damage and because it is electrically safe.

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12/8/91849

Axillary artery–coronary artery bypass grafting in patients with atherosclerotic ascending aorta

To the Editor:

We read with great interest the article by Bonatti and associates entitled "Axillocoronary Bypass for Severely Atherosclerotic Aorta in Coronary Artery Bypass Grafting" in the April 1998 issue of this Journal (1998;115:956-7). Atherosclerosis of the ascending aorta is a risk factor for the development of stroke in cardiac operations. The aortic no-touch technique, with a variety of modifications, has been used to avoid this complication and has substantially reduced the incidence of stroke.[1] The procedure described by Bonatti and colleagues seems to be a very useful method, and its successful applications have also been reported sporadically in cases in which off-pump coronary artery bypass grafting was done.[2,3]

To date we have performed this procedure on 3 patients, 2 with a severely atherosclerotic ascending aorta, in whom we used cardiopulmonary bypass, and 1 who had off-pump coronary artery reoperation. All 3 patients survived without evidence of cerebrovascular accident or perioperative myocardial infarction. Postoperative angiography revealed all grafts to be patent, although, unfortunately, 1 patient was found to have a 70% stenosis in the left subclavian artery just distal to the origin of the internal thoracic artery (Fig 1).

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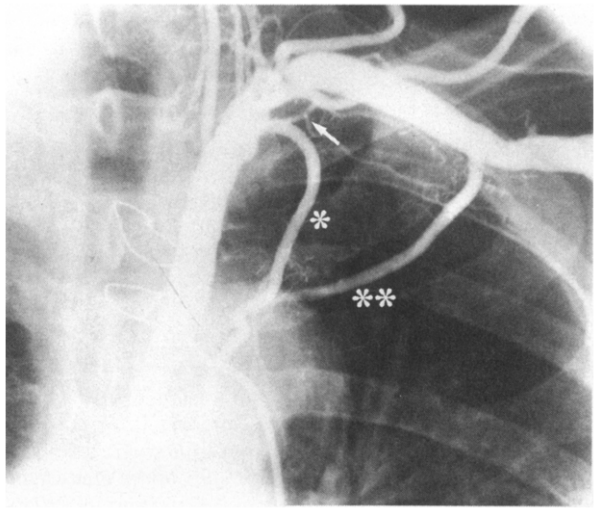

Fig 1. Postoperative coronary angiogram demonstrated a 70% stenosis *(white arrow)* in the left subclavian artery just distal to the origin of the internal thoracic artery. The left internal thoracic artery *(*)* and a saphenous vein graft *(**)* were widely patent.

The patient was a 78-year-old man who had 2-vessel disease (a 99% stenosis of the left anterior descending artery and a 90% stenosis of the left circumflex artery) with a calcified ascending aorta. The blood pressures were almost equal in the upper extremities. A median sternotomy was applied and the left femoral artery was used for arterial perfusion. After harvesting of the left internal thoracic artery and systemic heparinization, the left axillary artery–left circumflex artery anastomosis was completed with a saphenous vein graft according to the procedure described by Bonatti and associates. The left internal thoracic artery was then attached to the left anterior descending artery as an in situ graft. During the operative procedure the presence of a stenotic subclavian artery was not noticed at all. In this case, however, no signs of myocardial or left arm ischemia were present after the operation.

For an untouchable aorta, various modifications in technique to avoid manipulation, cannulation, or clamping of the diseased aorta have been proposed; these include use of the femoral artery or aortic arch for cannulation, no aortic clamp under hypothermic circulatory arrest, placement of an in situ arterial graft, or use of the innominate artery or descending thoracic aorta as an inflow site for a free graft.[1,4,5] The axillary artery, which is easy to access, has been used as the blood supply for extra-anatomic reconstruction and may possibly have sufficient flow to supply the myocardium. Use of the saphenous vein to revascularize the coronary artery is technically easy as well. Taking these points into account, axillocoronary saphenous vein bypass is thought to be a valuable procedure for patients with severe atherosclerosis of the ascending aorta. On the basis of our own experience, we support the use of this procedure. However, particular attention must be paid to the coexistence or future development of atherosclerosis in the subclavian artery, although a number of ways are available to cope with this problem.

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12/8/92306

Can you top this?

To the Editor:

In August of 1969, an 8-year-old girl underwent surgery for pulmonary atresia with a ventricular septal defect. The operation was performed by Christian Barnard in South Africa. The surgical repair consisted of closure of a patent ductus arteriosus and of 2 major aortopulmonary collateral arteries to the left lung, patch closure of the ventricular septal defect, and aortic homograft interposition between the right ventricle and the pulmonary artery bifurcation.

The patient remained free of symptoms for about 21 years, with 3 uncomplicated pregnancies. On October 1990 she came to us with signs of right ventricular hypertension. Routine clinical investigations (electrocardiography, chest radiography, echocardiography), magnetic resonance imaging, and cardiac catheterization confirmed an increase in systolic right ventricular pressure (80 mm Hg) caused by an obstruction at the level of the distal anastomosis of a completely calcified conduit. The investigations also showed the presence of a residual (or recurrent) large atrial septal defect. In April 1991, 21 years 8 months after the first surgical procedure, she underwent closure of the atrial septal defect and replacement of the right ventricle–pulmonary artery conduit with a 23 mm pulmonary homograft. At the end of the procedure systolic pressures of 25 mm Hg in the right ventricle and 105 mm Hg in the left ventricle were recorded. The postoperative course and the follow-up have been uneventful. Radiology (Fig 1) of the explanted conduit (Fig 2), as well